peared and bared the last year dry turf, very soiled by incrustements left by the snow, the albedo was 19 per cent, 18 per cent. Further, the area of new green grass augmenting from day to day and having attained with respect to the dry grass from 80 to 90 per cent, the albedo attained 23 per cent.

It was mentioned by A. Ångström that the wet grass gives a greater value of the albedo than the dry—e. g., for dry grass he obtained 32 per cent, whereas for wet grass (after a rainfall) but 22 per cent.

Among the series of observations I have had at my disposal some were made at once without rain and with rain. The picture obtained is the following: When the sun shines and the grass is wet the obtained albedo will be greater than with dry grass; if, on the contrary, the albedo of wet grass is measured, the sky being overcast, a smaller value is obtained for wet grass than for dry turf; this is clearly seen from Table 4.

TABLE 4.—*The albedo of a wet grass cover (under rain)*

Time of observations	Albedo	Conditions of observations
		May 29, 1929
h. m.	*Per cent*	
14 27	22.5	Dry grass, no sun.
14 50	33.2	Immediately after rain, sun.
14 54	25.7	No sun.
14 59	37.2	Sun.
[illegible]		*May 5, 1929*
9 20	19.2	No sun.
10 42	14.9	After rain.
16 40	14.0	Do.

It may be that in case of wet grass and the presence of shining sun the value of the albedo is greater owing to the crystalline reflection of sun rays. However, the observations being scarce nothing definite can be said in this respect.

AT WHAT TEMPERATURE DOES FROST OCCUR?

By W. J. HUMPHREYS

This is a familiar question most of us have answered many times, usually, perhaps, by saying that frost, in the sense of fine, feathery ice crystals, begins to form as soon as the temperature of the frosted object and the air in contact with it falls to 32° F., the well-known freezing point of pure water. We often, and properly, stress the fact that on still clear nights, the times when temperature inversions are pronounced, frost can occur on grass and other exposed surface objects, while the temperature of the free air only a few feet above the ground is several degress higher than this critical value at which, with loss of heat, water turns to ice, and, with gain of heat, ice turns to water.

That is as far into details as we usually go in answering this question, but really it is not far enough, for it omits one vitally important factor—the state of the humidity. Hoarfrost, a deposit of ice directly from the air, can not form until saturation is attained—that is, not until the temperature has fallen to the dew point, no matter how low that may be. We might, therefore, answer the question "At what temperature does frost occur?" by saying "Any temperature at or below the dew point of the air at the place of occurrence up to but not above 32° F."

The term "frost," however, has several meanings besides that given above. One of the commonest of these is "freeze," used especially in connection with injury to vegetation incident to the freezing of saps and juices. Frost in this sense, the freezing and consequent injury of vegetation, can not occur at temperatures above 32° F., since most saps are nearly all water. Neither can it occur until the temperature has fallen, certainly a little, and in some cases very much, below this point, as determined by the kind of plant and degree of concentration or dilution of the sugar and other freeze-resistant substances always present in plant liquids. But many vegetables and fruits do freeze at temperatures very little below 32° F. Also, in the spring and fall of the year, the seasons when vegetation is injured by freezing, the dew point usually is above 32° F. Hence, when vegetation is injured by freezing it is quite likely also to be covered by hoarfrost, and when covered by hoarfrost it is apt to be injured by freezing. It happens, therefore, that throughout the growing season, or from early spring to late fall, we associate the occurrence of hoarfrost with injury to vegetation, and the absence of hoarfrost with lack of injury, although, as explained, either can occur without any trace of the other.